Personal Computer Report

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Creating a RAMdisk

Chapter 1
Why create a RAMdisk?

Introduction

Adding additional Random Access Memory to your already well equipped IIGS provides advantages for every type of user, from the game player to the serious programmer. Adding memory with any of a number of memory expansion boards is as easy as plugging in chips and sliding the board into the slot. Of course, you can always have your trusty Apple dealer install it for you, so you won't have to see the innards of your machine. In either case, you can discover the advantages right away.

Besides the obvious advantages of being able to run larger and more complex games and applications at a faster pace, having extra memory enables you to create and use a RAMdisk. A RAMdisk is a portion of RAM that your computer uses like a floppy disk. The primary difference between a RAMdisk and any other disk is that the IIGS can access the RAMdisk much faster than a floppy disk or even a hard disk. This is what makes a RAMdisk so useful. The RAM memory is directly accessible by the data bus and the CPU. There are no disk controllers, interface boards, or spinning media to slow the data transfer process. Having a RAMdisk is also like having an extra floppy disk drive around, which is handy for copying from disk to disk.

You can use the RAMdisk to store data files that are accessed frequently by applications, or files that are accessed frequently by more than one application. You can also copy an application to your RAMdisk which may significantly improve its performance, depending on the application. Copying an application to the RAMdisk will always decrease the time

required to launch the application.

If you have enough RAM, you can even use the RAMdisk as a startup device. The advantage to this is that whenever you have to perform a warm boot by pressing the ♁-Control-Reset keys, the IIGS will boot from the RAMdisk. To do this you would copy your System disk to the RAM-disk (the RAMdisk size would have to be approximately 800K). You would need at least 2 Megabytes in order to do this and still have enough free RAM left for the operating system and an application to use. Keep in mind that the RAMdisk is volatile, and when the power is gone, so is whatever was stored in the RAMdisk.

Chapter 2
Create a RAMdisk

The Control Panel

You can create a RAMdisk by using the Control Panel – either the NDA version or the CDA version. The CDA version is accessed by pressing the ♁-Control-Escape keys. The NDA version is accessed by clicking the mouse on the apple in the menu bar and choosing the Control Panel NDA. In either case, go to the RAMdisk setup area by using the arrow keys in the CDA or by clicking on the RAM icon in the NDA.

Classic Desk Accessory

If you are using the CDA version, the screen will display information about the Minimum and Maximum RAMdisk size, and the largest selectable size. You will also see the current RAMdisk size, the amount of RAM currently being used, and the amount of remaining free RAM. To set the RAMdisk size, use the vertical arrow keys to highlight the minimum or maximum size selections. The use the horizontal arrow keys to increase or decrease the selection. Notice that as you change the minimum size, the maximum size changes so that it is always greater than or equal to the minimum size. The Control Panel takes care of that detail for you. It is very important to remember that when you set you RAMdisk size, the minimum and maximum values must be the same. The original IIGS operating system allowed you to set different maximum and minimum settings. But if you are using System Software version 3.2 or later, the settings must be the same or the RAMdisk will not function properly.

New Desk Accessory

The NDA version of the Control Panel displays two vertical scroll bars when you select the RAM icon. The scroll bar on the right represents the size of the RAM cache. The RAM cache is used by the operating system to speed up disk reading and writing. Ignore that scroll bar in this case. The left scroll bar represents the size of the RAMdisk. Its actual size is displayed in Kilobytes to the left of the bar. By moving the scroll bar indicator you can set the size of the RAMdisk between 0 Kilobytes and the total amount of RAM in your machine. Below the vertical scroll bars you will see the amount of RAM in use and the remaining free RAM.

RAMdisk size

Deciding on the size of the RAMdisk requires some careful thought. If you are not plan on using your RAMdisk immediately and often, then you should not create one because it will take up RAM that could otherwise be used by your applications. If you have only 512K of RAM then you should create a small RAMdisk only if you are going to be storing small files on the RAMdisk and using small applications. If you have 1 Megabyte of RAM then a RAMdisk size of 256K is usually adequate and leaves 768K for the operating system and your applications. You may set your RAMdisk size higher than that but then do not expect to be able to run larger applications like AppleWorks GS. If you have more than 1 Megabyte of RAM then you are free to set any size as long as you remember to leave at least 512K free for the operating system and applications.

Chapter 3
Activating the RAMdisk

When you have set the RAMdisk size, exit the Control Panel by clicking the mouse in the Close box (the NDA version). You do not need to completely exit the Control Panel if you are using the CDA version – simply press Return.

In order to activate the control panel you must either shutdown and then restart the computer, or do a warm boot by pressing ⌘-Control-Escape. When the Finder screen returns (the Desktop), you will see the RAMdisk icon which looks like a memory expansion card. Using the RAMdisk is as easy as using any other disk drive – simply double click to open it, etc.

Although you can *Initialize*, *Erase*, and *Verify* the RAMdisk, these steps are not necessary to use a new RAMdisk, since a RAMdisk is automatically formatted. If you wish to resize your RAMdisk, use the same methods described above. However, you must shutdown the computer in order for the new size to take effect. A warm boot will change the RAMdisk to the new size. Remember that doing this will cause anything that was stored on the RAMdisk to be lost, so be sure to copy those files to a floppy or hard disk before shutting off the power.

Always refer to the owners manual included with your memory expansion card. Remember that the data stored in the expansion memory (RAMdisk) is forever lost at the flick of the power switch or the fizzle of a fuse. Therefore, always save the contents of your RAMdisk to a regular disk (hard or floppy) periodically and especially before you turn off the power switch.

GS copy from 3.5 to 5.25

Chapter 1
Using ProDOS

Introduction

Copying files is easier than you think. In fact, it is one of the options built right into the System Disk, but not clearly referred to in the manual.

The IIGS's Desktop is an icon-based user interface. When you boot-up the System Disk it will automatically go to the Desktop. The System Disk is represented by a disk-like graphic in the right-hand corner of the screen. You can use the mouse and pointer to click on commands and move items around. From the Desktop you can use the Quick Copy command to copy from 3.5 inch to 3.5 inch floppy disks or from 5.25 inch to 5.25 inch floppy disks. However, you cannot copy from one size disk to a different size disk on the Desktop. You will need to go to System Utilities for this.

Following are hints and step-by-step instructions for copying between 5.25 inch and 3.5 inch floppy disks using Sys.Utils on the System Disk.

Hints

- First, try to copy from a 3.5 inch to a 5.25 inch floppy disk or vice versa. Practice with files or disks whose contents are unimportant... in the case a mistake is made and the files are accidentally deleted.
- If you need help while you are copying, press ?

Copying

- Boot your System Disk: With your computer off, place your System Disk in the 3.5 drive. Be sure the 5.25 drive is empty. Turn on the computer. (If your computer is already on, place the System Disk in the 3.5 drive, make sure the 5.25 drive is empty, then push ⌘-Control-Reset.)

- Open Sys.Utils, then open Sysutil.System: Use the up/down arrow keys or the mouse to move to Sys.Utils. Push Return or click on Open with the mouse. Open the Sysutil.System in the same manner.

- Use arrow keys to move cursor to Copy Files, then Return. (You must use keyboard commands in Sys.Utils. The mouse only works in the Desktop.)

- Computer asks,

  Where is your source disk?"

  Slot and Drive
  ProDOS Pathname

  (Use up/down arrow key to move to Slot and Drive)

- Computer asks,

  Where is your source disk?"

  Slot: 6 Drive: 1

  (Use up/down arrow keys to change number, right/left arrow keys to move to Drive, change the drive number, Return. Remember, Slot 6 Drive 1 refers to location of the 5.25 inch floppy drive). This is the location of the information you want to copy.

- Computer asks,

  Where is your destination disk?

  Slot and Drive
  ProDOS Pathname

  Use up/down arrow keys to move to Slot and Drive

- Computer asks,

  Where is your destination disk?

  Slot: 5 Drive: 1

  (Use up/down arrow keys to change slot number, right/left arrow keys to move to Drive, change the drive number, Return. Remember, Slot 5 Drive 1 refers to location of the 3.5 inch floppy drive). This is where you want the information stored after copying.

- Computer asks,

  Select some or all files on Disk?

  Some All

  (Use right/left arrow keys to move to Some or All, then Return. If you are copying the entire contents of one side of a 5.25 inch floppy disk, copy All files. If you are only copying selected files, use the arrow keys to move to those files, press the space bar to select them, then Return.)

- The computer will indicate when it is finished copying the disk or files with a "done" statement at the bottom of the screen. You can also find command choices at the bottom of the screen.

Chapter 2
Using GS/OS

Hints

- You may run into a dialog box that asks whether or not you want to replace file names that already exist with files that you are copying. In this case it is a good idea to check the destination disk for any possible duplicate file names before you start the copying process. If duplicates exist, you can decide if you want to copy over them or change file names in order to save the files from being copied over.

- Making backups of your files is one thing. Making copies of applications is another. If you are making a working copy of one of your software applications, follow the directions for making a backup that came with the software. If, on the other hand, you are making a copy of an application for which you are not a registered user, STOP! It is illegal to make copies of software unless you are the registered user, or if you have been given permission to make a backup for review purposes (in the case of rental software and product reviews).

Copying

Copying from one size disk to a different size disk under GS/OS is as simple as pointing, clicking, and dragging – that's all you do (almost).

- Be sure the 5.25 inch floppy disk driver has been installed. Use the Installer if you need to install it on your System.
- From the Desktop simply Open the 5.25 floppy disk from which you want to copy files, then highlight the files you want to copy.
- Drag those files onto the 3.5 inch floppy disk to which you want to copy files. Or Open the 3.5 inch floppy disk, then drag the files into a folder.

GS Finder

Chapter 1
System Software versions 3.2 and 4.0

Introduction

The new Finder program is a Desktop environment/launching and file handling program designed specifically for the IIGS. It is a radical improvement over the old Apple II Desktop program. Those of you who still have not traded in your old System disk for the new one are missing out. Not only does the new disk include the new Finder program, but it also provides a new font, new tools, printer drivers, and a new disk copy program.

The new disk comes with a new Shaston 16 font, to complement the nine fonts found on the original disk, and new drivers for LaserWriter, ImageWriter, modems, and AppleTalk. Also included are the QuickDraw Auxiliary and Print Manager tool sets. Most Apple dealers will copy the new System software onto your old System software disks free of charge. Ask your local authorized Apple dealer for details.

New features

When you boot the System disk, the Finder loads and executes in a little more than a minute. Then the familiar Desktop screen appears with icons representing the available disks. The feature that is first and most noticeable is that the Desktop of the Finder is in color rather than black and white. In fact, there is a menu option called ***Color*** which displays 16 different colors when pulled down. If you select an icon, then select one of these colors, that icon will be filled with the chosen color.

The next noticeable feature is the drive icon which is labeled "Drive". The Finder lets you know what is in your disk drives in a different way than the old Desktop did. Rather than having to select the menu item *Check Drives* to see what is on each disk, you now double-click on the "Drive" icon and the Finder will display another icon representing the 5.25 inch floppy disk in your drive. The Finder automatically displays an icon for your 3.5 inch floppy disk drive and your RAMdisk. If you eject the disk from your 3.5 inch disk drive, the associated icon will become grayed, indicating that the disk is no longer available. The grayed icon remains on the Desktop until you throw it in the trash or start an application. If you replace the disk, the icon returns to normal and you can open it double-clicking or using the menu or keyboard commands.

The menu bar has changed on the Finder. The ***Startup*** and ***Selector*** menus are no longer available, since the options provided by those menus are no longer required. The Finder provides those options automatically. A new ***Edit*** menu has been added. All but one of the options provided by this menu are dimmed and all are used with Desk Accessories only. If you select any dimmed menu item, the Finder will tell you how to activate that option. If you choose one of the options in the *Edit* menu, the Finder will tell you that it is used only with Desk Accessories.

Several of the options available in the old Desktop are not available in the Finder, such as *Lock*, *Unlock*, *Delete a file*, and *Check drives*. However, the Finder still provides these services, except for the *Lock* and *Unlock*. As I mentioned earlier, the drives are checked automatically, thereby eliminating the need for the *Check drives* option, and files are deleted simply by removing them or by dragging them into the trash can and then emptying the trash.

Two other new options under the ***File*** menu are *Print* and *Put back*. If you select a text file and then activate the *Print* option, the Finder will attempt to activate whatever application created that text file in order to print it. If it cannot find the application, an alert box lets you know and the option is cancelled. The *Put back* option provides a way of retrieving a file that you just tossed in the trash. This option will place the discarded file into its original folder, assuming you have not emptied the trash already. Emptying the trash completely removes the files from the Desktop. You must first select the file by double-clicking on the trash can, then clicking on the

file icon when it is displayed. This will also work if you leave an icon sitting by itself on the Desktop. The *Put back* option will put that wayward icon back into its window of origin.

You can open any of the displayed disks or directories (folders) by double-clicking on them or by using the menu/command keys in the usual way. However, the Finder has provided a helpful new way of displaying the files in each directory. Under the ***View*** menu you will find a *By small icon* option. This option allows you to display more files in a smaller window. The *By kind* option under the same menu is the same as the old *By type* option on the Desktop. The Finder allows you to open a file regardless of how it is displayed if you double-click on the small icon, or use the keyboard or *Open* option after selecting the file.

The ***Special*** menu provides five new options. The *Cleanup* option rearranges the icons in the active window in a more orderly manner. This is useful for when you have accidentally dragged one or more icons on top of one another. The *Select all* option allows you to select all the files in the active window in one step rather than having to select each item separately. The *Remove* option is the same as the old *Delete file* option. Remember that when you remove a file or files, it does not go into the trash, so you cannot retrieve it if you change your mind! That is why the Finder confirms your request before actually deleting the file. The *Empty trash* option is self explanatory. The *Preference* option allows you to alter some of the ways the Finder does things, such as saving the Finder data and display help for dimmed menu items.

In case you have not noticed, the Finder creates a file called *Finder.Data* on each disk that it accesses. This file contains information about what color you selected for the icon, for the disk, and for each file. The Finder also stores information in this file indicating which folders and files were displayed the last time the disk was accessed, what the size and location of the windows were, and how each filed was viewed. The next time the Finder accesses that disk, it will display the same folder and files in the same manner, unless the Finder is interrupted before it can store the information in the file. You can use the *Preferences* option to disable this feature.

The *Help* option, accessible under the Apple menu, provides information on copying disks and files, dimmed menu options, moving inactive windows and more. For example, when you select the *Selecting Icons* help function, the Finder will inform you that you can select a number of files in a window by holding down the shift key while clicking on each icon. This allows you to select files which are not adjacent to each other.

The most useful addition to the new disk for the average user is the FastCopy program found in the SYS.UTILS directory. This program is a quick and new tool for copying 3.5 inch or 5.25 inch floppy disks. This program will copy the full system disk (about 650K) in approximately 5 minutes with only ten disk swaps using one 3.5 inch floppy disk drive. The System Utility disk copy routine required 13 minutes and an incredible number of disk swaps to copy the same amount of information. If you have a RAMdisk that can contain the required amount of data, FastCopy will automatically copy the disk onto the RAMdisk, which means that you have to swap disks only once. This cuts the copy time down to about 2 minutes! The same is true for 5.25 inch floppy disks except that it is even faster. FastCopy will even format the disk for you! Unfortunately, the program does have some disadvantages. For instance, you can only copy between 3.5 inch or 5.25 inch floppy disks and you cannot give the copied disk a name that is different than the original. However, this program is the one to use for copying full disks. FastCopy will even compare the two disks. If the contents of the disk differs at all, even the name, then the program states that fact, beeps, and returns to the main menu.

Chapter 2
System Software version 5.0

Introduction

The new Finder program launcher that is provided with System Software version 5.0 has come a long way from the old Desktop program provided with the original IIGS System disk. The new Finder is a sophisticated tool for managing files and volumes as well as launching applications. There are other program launchers available for the IIGS, and each has its advantages, but the Finder provides all of the features and functions needed by most users.

The Apple menu

Under the Apple menu, where the NDAs reside, you find the standard *About the Finder* option. When you select this item, the standard dialog box appears that lists the version number of the Finder and the names of the people who worked on it. However, if you press the Shift and Option keys at the same time before you click the mouse on the Apple menu, the *About the Finder* option changes to *About the System*. Selecting this option produces a completely different kind of box that contains a title and 5 icons, each representing a different part of the System. The five parts are GS/OS, Tools, Finder, Firmware, and Software Administration. If you click on any of these icons, the window will clear, then display the names of the people who worked on that part of the System. Click the mouse outside of the box to make it go away.

There is also a *Help* option beneath the Apple menu. Selecting this option produces a dialog box that enables you to get general information on many of the functions and features of the Finder. This is a new addition to the Finder and it replaces the *Help for dimmed menu commands* feature that was present in Finder version 1.2. The Help dialog box provides information on

- Dimmed menu commands
- Selecting icons
- Disk copying options
- Saving window sizes and positions
- Moving inactive windows
- File copying options

This information provided by the Help dialog box is not comprehensive, but it does provide enough information so that you should be able to use all of the major features right away and learn about the less obvious tricks on your own.

The File menu

The ***File*** menu contains the standard file manipulation items. The *Open*, *Close*, and *Close All* options apply to files and windows and are self-explanatory. Because the new System Software is more efficient than previous versions, you can now have up to 10 windows open at the same time.

The *New Folder* option should be quite familiar. You should know however, that when creating a new folder, the Finder places that folder in any available space in the current window (space that is not already occupied by an icon), even if that space is not currently visible. Therefore, if you select *New Folder* and no new folder shows up in the window, scroll the

window. It will be there somewhere. Also, the Finder automatically selects new folders for renaming so you do not have to click on the word "Untitled" to rename the new folder. Just type the new title and press Return. The Finder now supports file names of up to 31 characters in length. The file name may contain upper and lower case characters, as well as punctuation and Mac-like graphic symbols. Some characters are not acceptable as file names because of GS/OS restrictions, but the Finder will let you know if you use an illegal character.

The *Print* option is there just in case somebody invents a generic printing NDA. Until such an NDA is installed, this menu option will remain dimmed.

The *Duplicate* option activates a handy feature that creates an exact duplicate of the selected file(s) in the selected disk or folder. The Finder provides a dialog box for naming the new copy. The icon for the new copy will be placed to the right and below the original icon. You can then move, copy, or rename the duplicate. You would use this feature, for example, if you wished to keep more than one copy of the same file on the same disk.

Many of you have by now discovered the advantage of dragging frequently used file and application icons onto the Desktop. These icons then stay on the Desktop and are there for you to see as soon as you boot the System. This is especially useful for hard disk users. The only drawback to this feature shows up when you want to put those icons back in their home folders. You have to remember where they came from and then open all of the windows to get to that one. With the *Put Away* option in the File menu, that is all done for you automatically. Just select the icon on the Desktop that you want put back and then select this item. The Finder will quickly put the icon back where it belongs. Note that if you drag any file or program on to the Desktop that is so deeply nested in folders that its pathname is longer than 65 characters, then the Finder will automatically put away that file when you shutdown or launch another application. The reason for this is that the Finder cannot store a pathname longer than 65 characters in the Finder.Root file and still maintain compatibility with older Finder versions.

The *Validate* option activates a feature that checks all of the selected files

and folders for corrupted files. A corrupted file is one whose storage structure has been damaged by exposure to magnetic fields or by accidental and partial erasure. This causes very unpleasant results. For instance, if a word processing document for AppleWorks becomes corrupted, the next time you open it in AppleWorks you may see scrambled text instead of your document, or two lines where you thought you had two thousand. Unfortunately, the *Validate* option will not repair corrupted files but will let you know which of the selected files, if any, are corrupted. If you always handle your disks with care then you should never have to use the *Validate* option.

The Edit menu

The *Undo*, *Cut*, *Copy*, *Paste*, and *Clear* options under the ***Edit*** menu are present in this menu for use by NDAs. Unless you have an NDA which performs some kind of editing function, these items will always be dimmed. The *Select All* option does just that. When activated, this feature selects all of the icons in the current window, or on the Desktop if no windows are open. You may then work with the selected icons as if you had selected them individually.

The *Show Clipboard* option enables you to see the contents of the Clipboard. The Clipboard is the place where everything goes when you use the *Edit* commands (*Copy*, *Paste*, etc.) in an application. You can often remove something from the Clipboard simply by dragging it. However, this depends on the type of information in the ClipBoard and the type of application that put it there. With the Finder, you can only view the contents of the Clipboard. You cannot drag anything into or out of it.

The View menu

The options in the ***View*** menu let you control the way the contents of a Finder window are displayed. If you select the *By Icon* option, the contents of each window will be displayed using the standard icons. Selecting the *By Small Icon* option will cause the contents of a window to be dis-

played using the smaller icons. You may choose to do this if you have many files in a window and wish to view their titles all at once.

The *By Name*, *By Date*, *By Size*, and *By Kind* options each cause the window to display the name, size, type, and modification date of each file in the folder. The difference between each selection is the order in which this information is displayed. If you select *By Name*, the files are listed in alphabetical order by name. If you choose the *By Date* option, the files are ordered according to the date when they were last modified, with the most recently modified file listed first. The *By Size* option causes the files to be listed in order of file size with the largest file first. The *By Kind* option causes the files to be displayed according to their file type. These are handy features that you are sure to find useful. You will obviously note that the horizontal scrollbar in windows that display information in text form is disabled. Yes, this does seem to be a nuisance but it appears that the designers of the Finder did it on purpose. The reason why is not clear.

The Disk menu

The ***Disk*** menu contains disk operation options. You would choose the *Initialize* option to re-initialize a disk. You would not need to choose it for a new disk since the Finder would automatically ask you if you wanted to initialize the new unformatted disk as soon as you inserted it into the disk drive. You may choose the *Erase* option to completely erase a disk. Remember that the initialize and erase procedures remove all data from a disk and are not reversible! However, the Finder does give you the opportunity to change your mind before it dumps your data.

The *Verify* option causes the Finder to check the selected disk for damaged or unusable disk blocks. The Finder will then let you know how many bad blocks were found and, if you wish, which blocks are bad. Usually, your next step would be to copy everything that you can from the damaged disk and then discard the disk.

Although the features activated by the options in the *Edit* menu will work on a hard disk, it is better to use the Advanced Disk Utility (ADU) on the System.Tools disk for all formatting, partitioning, erasing, and verifying operations on a hard disk.

The Special menu

The ***Special*** menu contains miscellaneous but very handy options. The *Cleanup* option causes the Finder to rearrange all of the icons in a window or on the Desktop so that they do not overlap. This feature will not gather all of the icons to one area of the window, however. That is, if one or more icons are located in an area of the window that is distant from a number of other icons, the *Cleanup* option will not combine those two groups. You can do that by dragging them together.

The *Empty Trash* option tells the Finder to do just that. Any files that were stored in the trash are subsequently removed from whichever disk they were dragged from. Before the trash is emptied, you may retrieve the items that you dragged into it by double-clicking on the Trash icon and dragging the items out of the Trash window. However, once the Trash is emptied, any item that was in it is removed from the Desktop.

The *Preferences* option causes the Finder to display the *Preferences* dialog box that contains three options:

- Color selected icons background instead of its outline
- Save Finder information onto disk
- Hide invisible files

The *Color selected icons...* option gives you greater flexibility in customizing icons with color. If this option is selected (as indicated by an X in the box) then whenever you select an icon and then a color from the *Color* menu, the interior or background of that icon will be filled with that color. For a simple icon like a folder, everything except the outline will be changed to the color that you selected.

If you changed the preference setting (by removing the X from the box) and then selected a folder icon and a color, then only the outline of the folder would be colored. Consequently, by alternating the preference setting, you can change the color of both the outline and the background. For more complicated icons, especially custom icons, the definition of outline and background are not as clear so experiment with them and see how much color you can add to your Desktop! Note that some custom icons are designed so that you cannot change the color at all.

The *Save Finder information onto disk* preference option controls whether or not the Finder remembers where you placed the icons in a window and what color you made them. If this preference is selected then the Finder will write this information for each window into a file called *Finder.Data* and place that file in every window. The Finder will also store the information about the icons that you dragged onto the Desktop into a file called *Finder.Root* and store that on the boot disk so that it can redraw them every time you reboot. If this preference option is not selected then the Finder will not store that data and it will draw the icons in the default location and color every time you boot.

The *Hide invisible files* preference option tells Finder whether or not to show invisible files. Currently, invisible files are Finder data files titled *Finder.Data*, *Finder.Def*, or *Finder.Root*. Since one or more of these files will show up in every window if the second preference option is selected then you may find them a nuisance. If so, select this preference option and the Finder will not show those files in any window although they will still be there.

The *Icon Info* option provides a nifty new version of an old feature. When this option is selected, the Finder will display a window containing information about the selected file. The window is nifty because it uses an index card system on screen which resembles a Rolodex® with cards that display the information. To view the different cards, just click on the little tabs on each card. The *General* card displays the name, kind, and size information. If the selected file is a folder then this card contains a small calculator icon in the corner. Clicking on this icon will cause the Finder to display the number of files and folders in the selected folder.

The *Where* card displays the pathname of the selected file or folder. If

your computer system is connected to a network then there will also be an *Access* card, which displays access and ownership information, as well as a *Comment* card that displays a comment that is associated with an AppleShare object.

The last option in the *Special* menu is the *Shutdown* option. This option provides a clean and safe way to shutdown your system without losing data or files. When you select this option, the Finder displays a dialog box that provides you with the following choices:

- Turn off system power
- Restart
- Return to launching application

The first option causes the system to dump the cache to disk, close all open files, shutdown the Finder, park the heads of your Apple hard disk, a few other 'behind-the-scenes' operations, and then clear the screen. It then displays a dialog box informing you that it is now safe to turn off the system. The dialog also contains a *Restart* button to use in case you changed your mind. The system does not actually turn off the power. You have to do that.

If you choose the *Restart* option from the first shutdown dialog, or by pressing the *Restart* button in the last shutdown dialog, then the system will perform a reboot just as if you had pressed the ⌘-Control- Reset keys. The contents of the RAMdisk are not lost during this kind of reboot.

If you choose the *Return to launching application* then the system will quit the Finder and re-activate the designated launching program. If you have not installed your own launching program then the system will simply re-activate the Finder since that is the designated launching program. There are a few other launching programs available. To install one you must rename the file in the System folder that is called "Start" to some other name like "Finder" (since it is the Finder). Then you copy the new launching program into the System folder of your boot disk and rename it "Start". Then reboot the System. The operating system will automatically start the new launching program.

That takes care of all of the menus except for the *Color* menu which is very straightforward. In case you have not already discovered this, if you choose the color black from the menu, the selected icon returns to its original colors since the Finder uses the color black to indicate a selected icon. However, you can color an icon black if you color its outline something else. The way you do this is to first set the first dialog preference and then select the icon. Now select the color black from the Color menu. The icon should change back to its original colors. Now deselect the first preference option and select the same icon. Choose any color from the *Color* menu except black. The outline of the icon should change to the color that you selected and the background should turn black. Again, for complex icons the change may not be as discernable or may not work at all.

Conclusion

There are many more changes to the Finder that are apparent only in the way the Finder works smoothly and intuitively. For example, the Finder now has a new network awareness which means that it functions better in an AppleTalk network environment. The Finder also takes full advantages of the more efficient routines in System Software version 5.0 software so that windows pop open and menus drop down. The Finder now uses RAM more conservatively by not copying some files, particularly some of the Finder icon files into RAM if the system contains only 512K RAM.

You can now copy one disk to another by dragging the disk icon onto the other disk icon even if the disks are different sizes. This is one example of how the Finder is better at doing what needs to be done. If it cannot perform the requested operation, or it has difficulty, it will let you know using a clear and concise dialog. As you can see, the Apple IIGS Finder version 1.3 is a sophisticated and intuitive application.

GS/OS

Chapter 1
System Software 4.0

The Apple IIGS has been astounding Apple enthusiasts for over two years with its advanced graphics and sound capabilities. But it wasn't until the IIGS was two years old that Apple gave the IIGS its real heart: GS/OS, the "Apple IIGS Operating System".

A thermometer

As soon as you turn on your IIGS with GS/OS on your boot disk, you will see a rectangle enclosing a picture of a IIGS and a welcome message. You will also see a horizontal thermometer. This little gadget fills with red from left to right indicating the status of the time left in the boot process. When booting is complete, the screen will change to the familiar Desktop. Besides a few changes to the menu bar, everything looks the same as in ProDOS 16.

Speed

The primary advantage to this new operating system is its speed! Depending on the number of desk accessories in the System disk Desk Accessories folder, GS/OS can boot to the Finder in a blinding 35 seconds! ProDOS 16 dragged along at about twice that speed under the same conditions. There are several reasons for this increase in processing speed – coding, disk caching, and a new data storage method.

ProDOS vs. GS/OS

ProDOS 16 is an operating system that is a variation or advancement of ProDOS 8. That is, ProDOS 16 is a 16 bit program built around the ProDOS 8 8-bit operating system. Because ProDOS 8 and the ProDOS file structure were stable, it was faster and easier for Apple to develop ProDOS 16 rather than an entirely new operating system. Apple was then able to release the IIGS when the hardware was ready without having to wait for the development of GS/OS. The IIGS comes equipped with a 16-bit architecture (including the 65816 CPU chip) so this 8-bit ProDOS operating system does not take full advantage of the extensive structure of the IIGS. GS/OS takes full advantage of the IIGS architecture because it is a 16-bit program. It is an expandable system containing separate RAM based device drivers and File System Translators (FSTs). Like ProDOS 16, GS/OS is downward compatible, which means it works with both ProDOS 16 and ProDOS 8 files, applications, system calls, and tools.

Disk cache

The second reason why GS/OS is faster than ProDOS 16 is a process known as Disk caching Basically, GS/OS sets aside a portion of RAM memory (the cache) for the storing of frequently accessed disk blocks for faster retrieval. This process derives its speed from the operating system's ability to read the blocks from the disk only once and write the blocks to RAM memory. When those blocks are required again, the operating system reads them from RAM. This process is fast, because the system does not have to wait for a disk drive to spin around. The default size of this cache is 32K but is adjustable by 32K increments using a New Desk Accessory called "Disk Cache" included with GS/OS. The bigger the cache, the greater the advantage unless your application does not require much disk activity. In that case, you won't see any improvement in performance. The size of your disk cache should not get in the way of memory needed for applications, since GS/OS is supposed to automatically trim the cache if necessary.

Disk blocks

Another reason for the speed of GS/OS is the way it reads and writes information to a disk. ProDOS and GS/OS operating systems do not write data onto a disk sequentially, character by character. Instead, these operating systems collect output data into a block in RAM. A block can contain up to 512 K, equal to about 512 typewritten characters. The operating system will write this block on to the disk in a location called a sector and then go back to build another block. A sector can contain two blocks of data. A sector is a part of a track and a track is one of many concentric magnetic circles on a disk (similar to the track on an 8-track tape cassette). Blocks are usually not written onto the disk in sequential sectors due to process time requirements of the operating system for a particular block. The disk is spinning during this processing time . Consequently, the next sector on the disk spins past the read/write head by the time the operating system is ready to read/write the next block. If the operating system tried to read/write the blocks to sequential sectors, it would have to wait until the disk rotated fully before the next sector could be accessed. This would cause a significant delay in the overall operating system processing.

Sector interleave

Designers solved this problem with a process called "Sector Interleave" or skewing. In this process, two blocks are stored on each sector and the sectors are interleaved. For example, suppose that blocks were stored in sequential sectors as described in the previous paragraph. Imagine that the numbers 1 through 10 represent a software sector or two blocks of data. The software sectors 1 through 10 are stored sequentially on the physical sectors. Sector Interleaving removes this alignment. Here, the software sectors are stored on every fourth physical sector. That is, there are three physical sectors in between software sectors 1 and 2, 2 and 3, 5 and 6, etc. This is the type of interleaving used by ProDOS 16. After writing (or reading) a software sector to a physical sector, the operating system builds another software sector. When the system is ready to write the next software sector, the disk rotates such that the next available physical sector is the fourth sector behind the sector that was just written to. This type of interleaving is said to be 4:1 (4 to 1) because 4 sectors pass the read/write head for every one that is written to (or read).

With GS/OS the software blocks are stored sequentially on every other physical sector, making GS/OS about twice as fast as ProDOS 16 in reading and writing to disk files. This translates to an overall increase in operating system speed.

Now that you understand the concept of interleaving, you have probably asked yourself the questions, "Can GS/OS read my ProDOS formatted disks?", and "Should I reformat and recopy all my disks with GS/OS?". As stated earlier, GS/OS is downward compatible with ProDOS 16. It certainly can read ProDOS formatted disks, but not as fast as it can read GS/OS formatted disks. As for reformatting and recopying disks with GS/OS, it depends on whether or not you plan on using ProDOS 16 again after you get GS/OS. Although the two operating systems are basically compatible, refer to Figure 3 and you will see that it will take ProDOS 16 longer to read a GS/OS formatted disk than to read one of its own disks simply because it is not fast enough to read that next sector before it spins past the read/write head, requiring an additional revolution of the disk to read the next sector. Therefore, any application running under ProDOS 16 that requires disk access will run slower if it must access a GS/OS disk. Keep that in mind before you start reformatting disks!

New structure

Speed is not the only reason why GS/OS is so special. GS/OS has a completely new structure that solves some of the major ProDOS 16 problems. The file access limitations of ProDOS 16 (8 open files, 14 active volumes, etc) have been removed allowing GS/OS an unlimited number of open files, active volumes, and devices.

System expansion

The operating system can be expanded just as easily as the IIGS hardware can. That is, for every new peripheral or card that is produced for the IIGS, a corresponding piece of software can be added to GS/OS. This is accomplished through the use of RAM based device drivers. The GS/OS System disk comes with a folder that contains files which are loaded into

memory by the operating system at startup. These files (sometimes referred to as updates in the Apple documentation) are the communication link between the operating system and peripheral devices such as 3.5 inch and 5.25 inch floppy disks, Small Computer Serial Interface (SCSI) devices, LaserWriters, and ImageWriters. Providing device drivers separately from the main operating system gives you the ability to remove unnecessary drivers, thereby decreasing boot time, and to add or modify drivers when necessary without requiring a major System update. GS/OS also has the ability to generate its own device driver on the fly for some devices. For instance, the system disk does not provide a RAM-disk driver so if you have enabled a RAM-disk, GS/OS will generate its own RAM-based driver!

FSTs

One of the most exciting features of GS/OS is the implementation of File System Translators (FSTs). A FST is a file which GS/OS uses to read a file system other than ProDOS. Files generated by DOS 3.3, Apple Pascal, the Macintosh, and MS-DOS are non-ProDOS file systems. The new system disk also contains FSTs for communicating with ProDOS files, character devices (like the keyboard and display), and the new High Sierra file system that is the accepted standard for use on CD-ROMs. But the FSTs for the other systems have not been developed yet.

The finest feature of the FST system is that new translators can be developed either by Apple or third party developers. Generation of an FST that enables GS/OS to read MS-DOS formatted disks will be of top priority. However, don't expect this soon, because translation is only part of the problem with treading MS-DOS disks. MS-DOS disks use a different storage format that is not currently readable by the available Apple II disk drives.

Two other eagerly awaited FSTs are the Macintosh HFS (Hierarchical File System) and AppleShare translators. The HFS FST enables GS/OS to read and write Macintosh files. However, they don't allow the IIGS able to run Macintosh software applications. The AppleShare FST enables the IIGS to participate in a full AppleTalk network with a Macintosh as file server. Presently, GS/OS contains the software necessary for your IIGS to access printers on an AppleTalk network but not to transfer files.

Utilities

When you boot GS/OS, it scans the IIGS system and looks for all disk devices. When it finds one, it looks for a device driver or FST in the /SYSTEM/DRIVERS/ subdirectory. If it finds one, it loads it. If not, it generates one automatically for all devices except SCSI drives and 5.25 inch floppy disk drives. You must install these drivers yourself using one of the three utilities provided with GS/OS.

The Installer

GS/OS consists of many different files located in separate subdirectories on two disks. Apple has provided a utility called the Installer that automatically updates your boot-disk files with the new files. The Installer is interactive, so you have the choice to install or de-install one device driver, all the device drivers and FSTs, or the entire System Software Update! When you start the Installer you will see a list of scripts in the left window. A script is a collection of instructions that the Installer follows to accomplish the transfer of a particular file. All you have to do is indicate the target disk and select the appropriate script. The Installer does the rest. Included with the installer is a help facility that will let you know what each script is for.

The Advanced Disk Utility

The second utility provided with GS/OS is the Advanced Disk Utility. This utility is used for preparing disks to receive data. It enables you to *initialize*, *erase*, *zero*, and *partition* disks.

Initializing

Initializing the disk divides it into tracks and sectors, and writes a file system on the disk so it can be read by a particular operating system. Initialization enables you to name and format hard disks, volumes, 3.5 inch and 5.25 inch floppy disks and RAM-disks. In the case of 3.5 inch floppy disks, you have a choice of 3 formats. The 800K 2:1 interleave is

the standard GS/OS format. The 400K 2:1 interleave is a GS/OS format for single-side 3.5 inch disks. The 800K 4:1 interleave is the standard ProDOS 16 format. For faster access, choose this format if the disk is to be used with both Apple and UniDisk 3.5 inch floppy disk drives, regardless of the operating system that is to be used.

Erasing

Erasing a disk simply removes the volume directory (the list of files on the disk). The disk is not actually erased, nor is the file format removed, so this process is faster than initializing. For all practical purposes, the files are gone and you can use the disk immediately for storing new files using the same file format. The new files are just written over the old files. However, the files are still accessable to someone who knows how to cause the computer to read a disk without using the directory.

Zeroing

If you have stored confidential data on a disk and you want to make sure that no one can recover that data, then you should zero the disk. In this process, the computer removes all the data and the file system by completely writing over the entire disk. This process effectively removes any data, but takes longer than the initialization or erasing process, because the computer has to overwrite every sector. After a disk is zeroed, it must be initialized again before it can store data.

Partitioning

Partitioning is the last feature of the Advanced Disk Utility. It provides you with two new and powerful features. The first partitioning feature enables storage of different documents and applications from two different operating systems on the same disk. The second feature removes the limit on volumes for a hard disk. So for those of you with an 80 MB disk with a card initializing program that allows only two partitions per card, you can now use your entire 80 MB rather than only 64 MB.

Take note!

If you have decided not to buy the System Software manuals, the Advanced Disk Utility is a good reason to change your mind. The execution of the ADU is not very intuitive and requires some tutorial time. Also, there are a few hazards associated with initializing, erasing/zeroing, and partitioning disks. The System Tools manual contains the information necessary to use the ADU effectively and safely. This manual also provides similar information on the Installer plus important information necessary for using the AppleTalk Printing Utilities available with GS/OS. The users guide also provides useful information.

The Finder

The third utility included with GS/OS is the Finder. The Finder is still the handy file managing Desktop, but with a few new features. First, the menus have three new commands: *Verify Volume*, *Validate* (a file), and *Shutdown*. *Verify Volume* counts any and all of the bad blocks on the disk. This process takes about 39 seconds for an 800K disk. If there are bad blocks on a disk, the Finder will tell you how many and, if you wish, will show you which ones are bad. If you have a disk with bad blocks, you should copy all the files you can from that disk to another disk, then reformat the old disk. Verify the old disk again and discard it if bad blocks still exist, since that means that the magnetic material has been damaged.

The *Validate* command checks the integrity of a file or group of files. If you open a file and get hieroglyphics, the file may be corrupted.

The *Shutdown* command gives you an efficient way to shut down your system. This command also shuts down the device drivers and FSTs, and clears the RAM cache of any remaining data. When you select *Shutdown*, GS/OS gives you three choices: 1) Turn off system power, 2) Restart, or 3) Return to launching application. If you select the first choice, the system acts as if you had turned off the power switch, at least in terms of retained memory. This is called a frigid boot. Whatever you had in memory, specifically the RAMdisk, is lost during the boot. The last dialog box

you see after making this choice gives you a chance to restart the computer. Choice number 2 simply does the same thing as pushing ⌘-Control-Reset. The system reboots without losing the contents of the RAMdisk. This is referred to as a cold boot. The last choice simply returns you to the Finder.

The Finder also provides all of the initialization options that the ADU provides and takes advantage of new software for copying files to other folders or volumes. This new code implements what is called "Session Copy", which waits until after copying the data files before it writes the pertinent data into the new files directory. This minimizes movement of the disk drives read/write head. Couple this process with the new interleave format, and you achieve decreased copy time. The copy functions also keep you better informed of the copy process with the same dialog box used by the Macintosh when it copies files. This box displays the number and names of files remaining to be counted and a thermometer which indicates how much of the copy process has been completed.

GS/OS tech talk

If you are a programmer, then you will be happy to know that GS/OS supports all ProDOS calls. All GS/OS calls go through the System Call Manager (SCM), which directs them to the proper FST. The SCM and FST then use the Device Manager to direct input/output to the proper device driver. This allows an application to use the same set of GS/OS calls to process data from different device types.

In GS/OS, the calls are separated into two classes – Class 0, which are all the ProDOS 16 calls, and Class 1, which are all the GS/OS calls. Most Class 0 calls have a corresponding Class 1 call, but there are Class 1 calls that do not have Class 0 equivalents. The Class identifier is located in the high order three bits of the call number. The GS/OS calls require a parameter count which means that the call data structures need to be only as long as necessary. Many of the GS/OS calls use the same data structures that are used by ProDOS 16. ProDOS has two types of files – Directory and General Data. GS/OS provides a third file type, Extended, which is the same type of file the Mac HFS operating system uses. This file structure is split into two components – resource and data. The data component

contains program code, etc., and the resource component contains data structures, menu data, etc. This configuration is primarily used by programmers to improve the organizational structure of programs. The introduction of the resource and data component format will eventually lead to new resource structures in programs that can be edited by a program user. New resource editors will enable you to customize the look of your copy of a program.

GS/OS also uses two types of strings – Class 0 and Class 1. Class 0 strings contain a length byte, while Class 1 strings contain a length word (two bytes). Class 1 strings that are output from a GS/OS call make provision for the length of the output buffer by adjusting the buffer if it is too small.

GS/OS contains a number of changes to the types and uses of strings, prefixes (31 now vs. 16), pathnames, and filenames. These are now extended to allow use of any legitimate Mac HFS pathname. Some prefixes (Type 2) may use a colon (:) or slash (/) as a separator between the volume name, directory names, and the filename. With GS/OS you can specify device names. Each device name begins with a period (.) followed by a unique device identifier. A pathname can also be tacked onto the end of the device name. Examples of character device names are .CONSOLE and .PRINTER.

Wrap up

GS/OS is indeed a new and more powerful "heart" for the IIGS, but it does not fix all the problems of ProDOS 16, nor does it meet all expectations. One of the major shortcomings of System Software 4.0 is its lack of AppleShare compatibility. The new System update does include AppleTalk software that allows your IIGS to communicate with printers shared in an AppleTalk network. Fortunately, that communication extends to a Macintosh or an AppleShare file server, the heart of an AppleTalk network, in System Software 5.0. GS/OS does provide an increase in system speed. However, disk access and screen redrawing can still be slow for the larger and more complex programs being developed for the IIGS. If these programs and existing programs take advantage of the new GS/OS resources (especially disk caching) then maximum speed can be attained.

Is ProDOS 16 obsolete? No, you should keep ProDOS 16 to use with older Apple IIGS software that is not compatible with System Software version 5.0. Apple will no longer update ProDOS 16, however.

Because of the difference in file structure between MS-DOS and Apple disks, a MS-DOS FST is like a bicycle without wheels. When the new 1.44 Megabyte FDHD external drive that came out with the new Macintosh IIx becomes available to IIGS users, then the MS-DOS FST will be a real prize!

Although the High Sierra CD-ROM driver will allow playback of video, audio, and text on the IIGS from a CD, most of the computer CDs available are in the MS-DOS format. Until the MS-DOS FST is available, a IIGS user will have to settle for the limited library of CDs available.

Finally, reports of possible bugs in GS/OS are beginning to appear. Common problems appear to be related to the GS/OS disk caching operation. It is suspected that some programs (possibly even the Finder) may be accidentally overwriting the RAM allocated for the cached data thereby causing lost data and lost files. Remember to save your documents often, and print out a hard copy after each revision.

Chapter 2
System Software 5.0

In June 1989 Apple released System Software version 5.0 to an expectant public. This version of the System Software includes many improvements to the Toolbox, GS/OS, utilities, as well as new tools and features.

Speed

- Drawing – 200% to 300% faster
- Window manipulation – 300% to 800% faster
- Switching between P8 and GS/OS – 700% to 1500% faster
- Small Computer Systems Interface throughput – 400% faster

AppleShare

The biggest new feature in System Software version 5.0 is that the software is now AppleShare Aware. A new AppleShare FST has been created to work with GS/OS and make the IIGS a true network machine. The Finder utility and GS/OS have been modified and improved to work well in a network environment.

Resources

System Software version 5.0 includes the capability to create and use resources like those used by the Macintosh. This is an advantage to programmers and users alike, since it allows smaller and more efficient programs. Eventually, Resource Editors will be developed to allow end users to customize their programs.

ExpressLoad

ExpressLoad is a new part of the System Loader. It speeds up the booting and launching of applications by remembering where each segment of a program is on disk, rather than having to search for each segment. In order to take advantage of ExpressLoad, a program must be modified to the ExpressLoad format. The latest versions of GS/OS and AppleWorks GS, for example, are in ExpressLoad format. This is one reason why they load more quickly than before.

Toolbox

Three new toolsets have been added to the Toolbox – the Resource Manager, the SCSI Manager, and the Text Edit toolset. The SCSI Manager works only with the Apple SCSI card. The Text Edit toolset is designed specifically to make the design of text editing functions and programs easier. Like most tools, only programmers will use these new toolsets directly . However, when commercial Resource Editors are available, end users will be able to use the Resource Manager to customize their applications that use resources.

The Advanced Disk Utility

The GS/OS team has fixed a number of bugs in the Advanced Disk Utility. It now allows you to partition your hard disk into at least 8 partitions. However, this is true only if you are using an Apple SCSI card and if your startup files are not on that hard disk.

The Installer

The Installer now lets you select more than one script at a time. The *Install Everything Possible* script has been replaced by two new scripts – *Latest System Files* and *Latest System Files (No Finder)*. These two scripts do the same thing as the *Install Everything Possible* script, but also give you the option of not installing the Finder. The Installer also provides more helpful hints and warnings before and during the execution of some scripts.

The differences between version 5.0 and 5.02 are primarily related to problems in 5.0 that are fixed in 5.02. There are many more changes and improvements than these few mentioned here. You will notice the effect of them as new programs that take advantage of them are published. Even now you will see new features, like scrolling menus and pop-up menus in the Finder, ADU, and Installer.